obtained for the apparatus.

[0035] Here, specific dimensions and capacities of the high frequency reaction processing apparatus of the present embodiment are shown as an example. The frequency of the high frequency wave 47 is 2.45GHz, the electromagnetic wave mode thereof is TM11 mode, and the maximal power thereof is 1kW. The high frequency wave coupling portion 42 connects to the dielectric outer container 40 at the opening of the width 70mm height 130mm. A quartz tube 54 having an outer diameter of 150mm, thick of 3mm and Z-axis direction length of 200mm is coated on an outer side face with a fluororesin film layer 53 made of PTFE having a thickness of 2mm, and the dielectric outer container 40 is formed by them. The dielectric inner container 41 is formed of a quartz tube 55 having an outer diameter of 115mm, thick of 3mm and Z-axis direction length of 200mm. The covering conductor 43 made of aluminum is formed of an aluminum plate having a thickness of 0.5mm. A spatial region of 3mm is provided between the covering conductor 43 made of aluminum and the outer side face of the dielectric outer container 40 whose outer side face is coated with the fluororesin film layer 53 made of PTFE having a thickness of 2mm.

[0036] The vacuum container wall 59 made of aluminum is formed in a disc shape having a thickness of 20mm and outer diameter of 200mm, the vacuum container wall on the lower side has a hole of 100mm diameter at its center, and the hole is closed by the door sample stage. The decompression exhaust port 56 is a tube having an inner diameter of 20mm and an